In the Claims

1. (currently amended) A method of determining the vibrational modes of a cantilever ~~to improve the accuracy of a scanning force microscope~~ comprising the steps of:

providing a cantilever composed of a material having a known Young's modulus, E;

determining the cross sectional area, A, of the cantilever;

determining the length, L, of the cantilever;

determining the geometric moment of inertia, I, of the cantilever;

determining the slope of a force-distance curve, G, of the cantilever;

determining the phase velocity, V, of propagation of waves through the cantilever;

determining the force-separation slope, β, of the cantilever based upon the following equation:

$$\beta = GL^3 / EI$$

~~calculating the vibrational modes of the cantilever~~ determining discrete values of a reduced frequency squared, ξ, of the cantilever based upon the following equation[[s]], where n identifies the index of the discrete value:

$$\frac{1+\cos\xi_n \cdot \cosh\xi_n}{\sin\xi_n \cdot \cosh\xi_n - \cos\xi_n \cdot \sinh\xi_n}\xi_n^3 = \beta$$

determining discrete values of vibrational modes, ν, of the cantilever based upon the following equation, where n identifies the index of the discrete value:

$$[[n]]\nu_n = (A^{1/2} V) / (2[[p]]\pi L^2) [[x]]\xi_n^2$$

~~wherein:~~

~~b=GL /EI; and~~

~~G= slope of a force-distance curve; and~~

~~electronically calibrating the scanning force microscope based upon the vibrational modes.~~

2. (currently amended) The method of claim 1, further comprising the step of exciting a first transducer positioned proximate a fixed end of the cantilever so that the cantilever enters a plurality of natural vibrational modes.

3. (original) The method of claim 2, wherein the step of exciting the first transducer comprises exciting the first transducer through a range of frequencies.

4. (original) The method of claim 2, further comprising the step of detecting motion at a free end of the cantilever.

5. (original) The method of claim 4, wherein the step of detecting motion at a free end of the cantilever comprises detecting vibrations through a second transducer attached to the free end of the cantilever.

6. (original) The method of claim 5, further comprising the step of comparing the detected motion at the free end of the cantilever to the excitation proximate the fixed end of the cantilever to determine the vibrational modes of the cantilver.

7. (currently amended) A method of determining the resonant frequencies of a cantilever comprising the steps of:

fixedly attaching a cantilever ~~having a length of at least one centimeter~~ to a base, wherein a distal end of the cantilever remains free, and wherein the cantilever has a known spring contestant κ;

exciting the cantilever proximate the base, wherein the excitation occurs through a range of frequencies;

measuring any displacement in the distal end of the cantilever simultaneous to the step of exciting the cantilever; [[and]]

detecting a plurality of resonance frequencies by comparing the measured displacement in the distal end of the cantilever to the excitation; and

determining a slope force separation curve, k, based upon the following equation:

$$\frac{1}{3}\frac{1+\cos\xi\cdot\cosh\xi}{\sin\xi\cdot\cosh\xi-\cos\xi\cdot\sinh\xi}\xi^3=\frac{k}{\kappa}$$

8. (original) The method of claim 7, wherein the step of exciting the cantilver comprises attaching a first piezo-electric crystal to the cantilever proximate the base and electrically exciting the first piezo-electric crystal.

9. (original) The method of claim 8, wherein the step of measuring any displacement in the distal end of the cantilever comprises attaching a second piezoelectric crystal to the distal end of the cantilever and measuring an electric signal generated by the second piezoelectric crystal.

10. (original) The method of claim 9, wherein the step of detecting the plurality of resonance frequencies comprises plotting the electrical excitation of the first piezoelectric crystal against the measured signal generated by the second piezoelectric crystal.

Please cancel claims 11 and 12 without prejudice.

13. (original) The method of claim 9, wherein the step of attaching a second piezoelectric crystal to the distal end of the cantilever further comprises positioning a buffer between the cantilever and the piezoelectric crystal.

Please cancel claims 14-18 without prejudice.